THE NATURE CONSERVANCY NEWS

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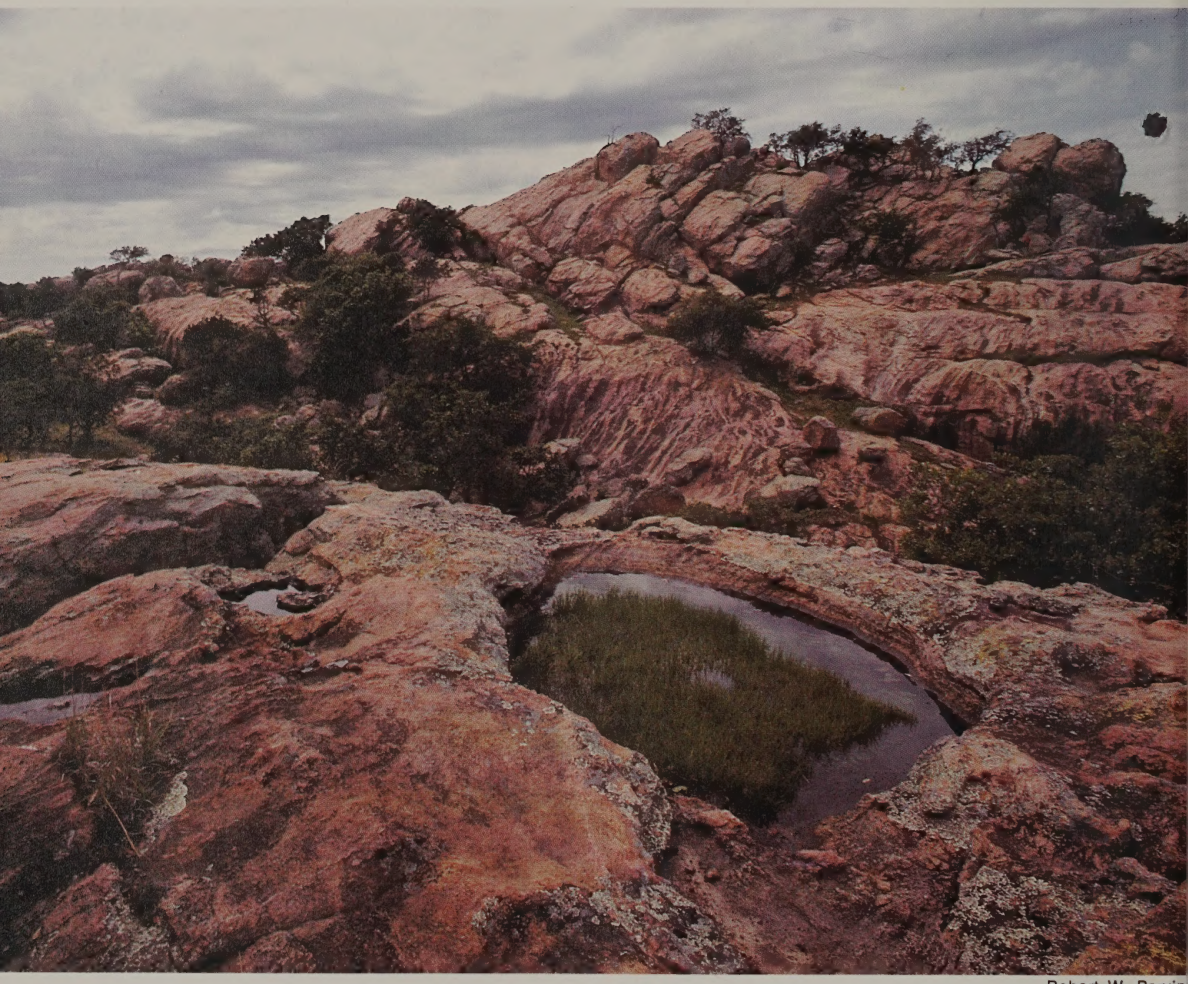
TEXAS

Texas only looks tough.



Robert W. Parvin

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THE NATURE CONSERVANCY NEWS

VOLUME 32, NUMBER 5
SEPTEMBER/OCTOBER 1982

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THE NATURE CONSERVANCY NEWS is published bimonthly by The Nature Conservancy, 1800 North Kent Street, Arlington, Virginia 22209

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COVER: Sandstone boulders, rounded by river-rolling, edge the Lower Rio Grande in deepest South Texas. Photo by Robert W. Parvin.

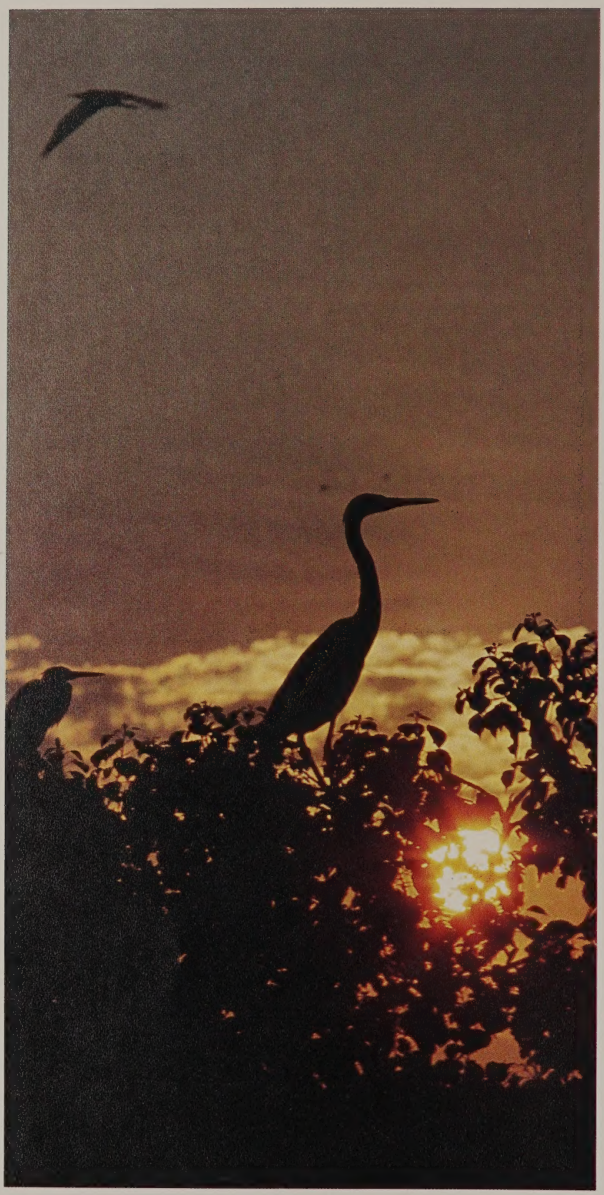
The Nature Conservancy is a national conservation organization committed to the preservation of natural diversity by protecting lands containing the best examples of all components of our natural world.

To date the Conservancy and its members have been responsible for the preservation of 1,881,598 acres of forests, marshes, prairies, mountains, and islands: home to rare and endangered species of wildlife and plants. 2,947 projects have been completed since the acquisition of the first preserve in 1954. Approximately 60% of all preserves are retained by the Conservancy and managed by staff and volunteer land stewards.

A membership, non-profit organization, the Conservancy was incorporated in 1951 in the District of Columbia for scientific and educational purposes.

A copy of the last financial report filed with the Department of State may be obtained by writing to: New York State, Department of State, Office of Charities Registration, Albany, New York 12231, or The Nature Conservancy, 1800 North Kent Street, Arlington, Virginia 22209.

by Suzanne Winckler



Photos by Robert W. Parvin

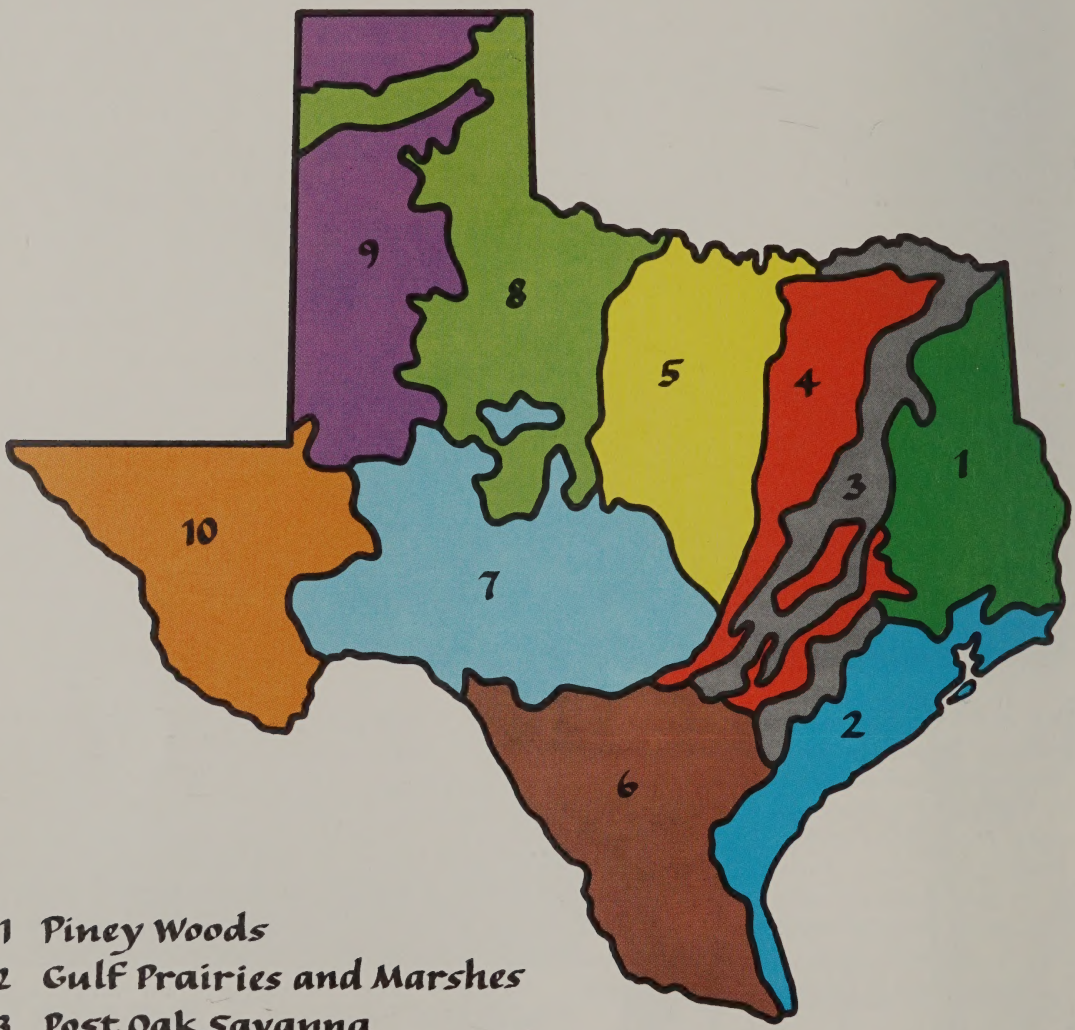
Texas Diversity: From the Piney Woods to the Trans-Pecos

LIKE A FAVORITE uncle, Texas has a big embrace. Because of its size (860 miles by 773), geographic position, physiographic features, and the varying environments and climates it encompasses, Texas is one of the most biotically diverse states in the country. Even Texans are a little amazed by how much the state contains: almost 5,000 species of vascular plants, including 2,000 wildflowers; some 600 species of birds; mountains, deserts, prairies, some of the longest barrier islands in the world. . . .

You can picture Texas in three parts. The first begins at the state's crescent-shaped coastline, where the land was once the bed of an ancient ocean. It inclines from dunes and marshes upward all the way across the state to the High Plains of the Texas Panhandle. These gentle steppes form the central portion of the state, an area that is virtually unbroken except for two memorable topographical landmarks: the Balcones Escarpment, which runs east-west from Austin to Del Rio, and the Caprock, which bisects the Panhandle plains north to south. On the eastern side of this midsection lies the Piney Woods (the second part), an extension of the forests of the Deep South. And on the west side is the third part—the Chihuahuan Desert, where vast, arid flats are broken by three isolated ranges of mountains, "misplaced" pieces of the Rockies. That's Texas, in the simplest geological terms.

As any Texan not perpetually confined to a major metropolitan area will tell you, vast subtleties lie within these three broad regions. It is easiest to consider the differences botanically, since plants are at once blatant and sedentary indicators of ecological diversity. Botanists generally recognize ten vegetational areas in Texas. The first, the Piney Woods of East Texas, is perhaps the least Texan in aura. Mostly deep and dark and evergreen, it may seem slightly claustrophobic to a Texan bred farther west on the plains; but it has a winning lushness, a church-in-the-wildwood feeling that is cool, soothing, and Southern. The Piney Woods contain about 15 million acres, most of it considered prime forestland by the timber industry. The region's 35 to 50 inches of rain each year water not only pines—chiefly longleaf, loblolly, and shortleaf—but also swamp and streamside stands of hardwoods (beech, oaks, elm, and magnolia) and myriad plant species, such as sphagnum mosses, pitcher plants, orchids, sundews, and milkworts.

Vegetational Areas of Texas



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3 Post Oak Savanna
4 Blackland Prairies
5 Cross Timbers and Prairies
6 South Texas Plains
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The Big Thicket, portions of which are being preserved by the federal government, is a subset of the Piney Woods. Tucked in the southeast corner of Texas, it is generally lower and wetter, and more hardwoods mingle with the pines. The Nature Conservancy has several holdings in the Piney Woods, the largest of which is the 2,138-acre Roy E. Larsen Sandyland Sanctuary in the heart of the Big Thicket.

The ivory-billed woodpecker, the majestic crested bird that is probably extinct or nearly so, is still sought in the Piney Woods. Its much smaller and less flamboyant cousin, the red-cockaded woodpecker, is rare but found with regular success by birders. But the region is equally known for its more common birds—the wood thrush with its bell song, the shockingly yellow prothonotary warbler, and the booming barred owl.

The eastern edge of the Piney Woods merges quite abruptly with prairies and scattered woods. To the untrained eye this section all looks alike; but botanists separate the 37 million acres into three vegetational zones—the Post Oak Savanna, the Blackland Prairies, and the Cross Timbers and Grand Prairie. Some authorities think that the Post Oak Savanna was once predominantly a tallgrass prairie, but trees (mainly post and blackjack oaks) and brush have increased with the conversion of the land for farming and grazing. The Blackland Prairies, which take their name from the fertile dark clay soil, are a certifiable prairie ecosystem.

Dominant grasses in the three zones are big and little bluestem, Indiangrass, eastern gamma, switchgrass, and side oats grama. Because this realm is well drained by streams and rivers, it also supports more trees than the "average" prairie. Pecan, cedar elm, various oaks, and Osage orange dot the landscape, with some mesquite invading from the south. The region has long been plowed, at the expense of the native prairie; only pockets of undisturbed grassland remain. Consequently, the three sister systems contain some of the most critically endangered lands in Texas. Two of these rare pockets are preserved in the Conservancy's Marlin and Telens Prairies, 137-acre remnants of the Blackland Prairies.

FOLLOWING THE LIP of the Texas coast, and extending inland about 60 miles, are the Gulf Coast Prairies and Marshes. Economically, the northeastern end of this region is intensively devoted to transporting and refining oil, activities best demonstrated by the mammoth Houston Ship Channel. Ecologically it is noted for its extensive marshlands, a fair number of which are now held in preserves. These sanctuaries include Texas Point National Wildlife Refuge, Smith Marsh, and Barrow and McFaddin Ranches—all purchased by The Nature Conservancy for transfer to the federal refuge system.

Here in the marshes, treeless earth meets endless sky. But this seemingly simple setting harbors hundreds of thousands of wintering geese—Canadas, white-fronts, snows, Ross's. The coastal flats and scattered oak stands of the region are a critical landfall for birds taking off from the Yucatán Peninsula and migrating across the Gulf of Mexico each spring. The woods at the small fishing village of High Island and the mud flats at Bolivar Peninsula near Galveston are two of the richest birding spots in the country.

Farther south along the bending coast is the Attwater Prairie Chicken National Wildlife Refuge, home not only for its rare namesake but also for wintering geese, sandhill cranes, and birds of prey. This 8,000-acre refuge grew around a 3,500-acre nucleus jointly created in the mid-1960's by The Nature Conservancy and the World Wildlife Fund. Critically located near Houston, the sanctuary was saved from agriculture—and urban sprawl.

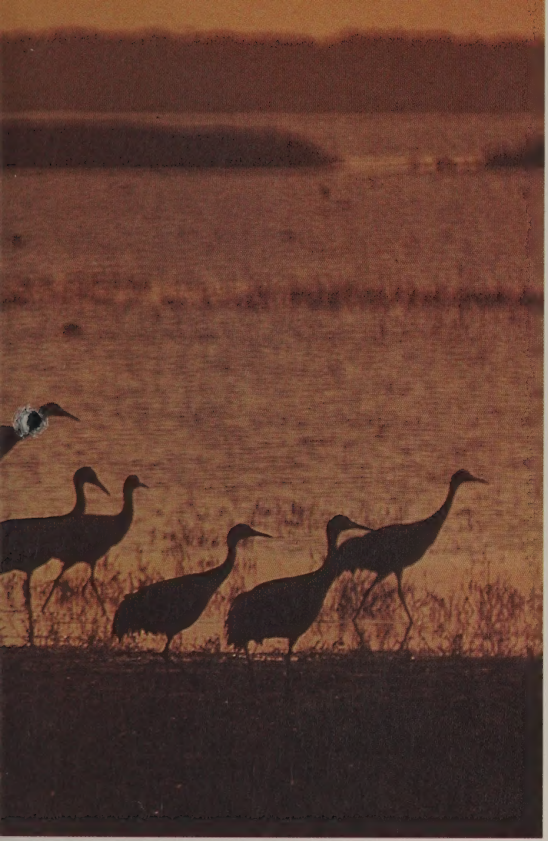
Beginning at mid-coast near Corpus Christi, the shoreline is edged by Mustang and Padre Islands, described as part of the longest chain of barrier islands in the world. The islands' dunes are topped with sea oats and beach evening primrose. In the fall, particularly, these dunes serve as sentry roosts for migrating peregrine falcons; and at any season there are lone willets, little battalions of sanderlings, and packs of gulls and terns feeding or resting near the surf.

The southernmost coastline of Texas is tropical enough to support mangroves. Most of the Gulf Coastal Prairies, however, are ideal for grazing and for oil and natural gas production. Both activities occur on the King Ranch, a world-renowned ranching and petroleum enterprise that is also a wildlife refuge in its own right, especially for North American raptors. Bisecting the King Ranch from north to south, U.S. 77 is an excellent highway from which to observe wintering hawks.

DUE WEST of the Gulf Coast Prairies and Marshes and wedged below San Antonio are 20 million acres of the South Texas Plains or brush country. Bounded on the west by the Rio Grande and Mexico and on the north by the Balcones Escarpment, it is a vast, quiet, and unpeopled region. The brush country is actually a gently rolling plain, cut by arroyos and streams, and blanketed with low-growing vegetation—mesquite, granjeño, cacti, huisache, catclaw, blackbrush, cenizo,

Above: Sandhill cranes stand and stretch in the honey-colored Gulf Coast sun. The Conservancy has safeguarded nearly 70,000 acres on the Texas Gulf—fertile marshland habitat for numerous waterfowl and wading birds. Left: The last light makes quicksilver of the Rio Grande as it courses toward Big Bend. To the river's right is Texas, to its left Mexico.

Robert W. Parvin



Robert W. Parvin

guayacan. Debate about the virgin state of the area lingers, revolving around the extent to which it was originally dominated by mesquite. It's generally assumed that it was once a shortgrass prairie; but cattle grazing on mesquite beans disseminated the seeds, thus promoting the spread of the brushy plants away from the banks of arroyos and streams.

In deepest south Texas, a narrow ribbon of land skirts the Rio Grande from Falcon Lake to Brownsville. It is part of the brush country and yet, in many ways, is quite different—and highly threatened. This is the tropical zone of Texas, where extensive groves of the native *Sabal* palm used to flourish but are now reduced to a few stands near Brownsville, and where a few wild tropical cats—ocelots and jaguarundis—still take refuge. Sanctuaries in the area include the Santa Ana National Wildlife Refuge, the Audubon Society's Sabal Palm Woods, and the 367-acre Boscaje de la Palma (also called the Lower Rio Grande project), which was acquired by the Conservancy and turned over to the U.S. Fish and Wildlife Service for inclusion in a proposed corridor of sanctuaries along the Rio Grande.

IN THE WEST-CENTRAL part of the state, the flat terrain of the Brush Country halts at the Balcones Escarpment, which serves as the southern edge of the Edwards Plateau. The 24-million-acre Plateau is semiarid, rocky, and rugged, likened by some people to Greece and the south of France. Dominated by juniper (cedar to most Texans) various oaks, and mesquite, the region overlays a foundation of honey-combed limestone—an immense underground reservoir called the Edwards Aquifer, which spills out in many springs. To ranchers this is goat and sheep country; to people from Dallas, Houston, and San Antonio, it is a nearby retreat or, better yet, a place for a second home in one of the grotto-like canyons or along one of several still-clear rivers; to birders it is home for the golden-cheeked warbler and black-capped vireo.

The Edwards Plateau is a fragile zone, often bypassed by conservationists. The Nature Conservancy is working to reverse this trend. In 1978 it purchased a 1,640-acre area that encompasses Enchanted Rock, a 325-foot-high granite dome, second in size only to Georgia's Stone Mountain. Conveyed for management to the Texas Parks and Wildlife Department, the dome and the property around it support 15 species of rare and/or endemic plants. The Conservancy's latest acquisition is Honey Creek Ranch, about 25 miles from San Antonio.

George O. Miller

A view from Enchanted Rock State Park on the ecologically fragile Edwards Plateau. The Conservancy acquired 1,640 acres here in 1978 for transfer to the state.

The Rolling Plains of the eastern Panhandle.

The Edwards Plateau tilts slightly upward to merge into the Panhandle of Texas, the "last gasp" of the Great Plains. Bisected north to south by the Caprock Escarpment, the 44-million-acre Panhandle is divided into two rather distinct areas —the High Plains to the west of the Escarpment and the Rolling Plains to the east. The Rolling Plains were once pristine tallgrass prairie; the slightly more arid High Plains were a mixture of grass species. Shortgrass or tall, any prairie in the Panhandle is a rarity today; the region is grazed by cattle and heavily farmed for wheat, cotton, and sorghum. The largest nonagricultural landholdings are Muleshoe National Wildlife Refuge, which contains several playa lakes where sandhill cranes winter, and Palo Duro Canyon State Park, the largest in the Texas park system.

Far West Texas, the 19 million acres beyond the Pecos River, is called the Trans-Pecos and harbors the state's only mountains. The combination of Chihuahuan desert flats and three mountain ranges makes the region very complex, both geologically and botanically. But it's really not a single unit at all. What occurs on the summit of the south rim of the Chisos Mountains—alligator juniper, Texas madrone, ponderosa pine, for example —bears no resemblance to the vegetation of the surrounding desert (creosote, tar bush, ocotillo, and lechuguilla).

IN A STATE whose natural beauties are frequently subtle and sometimes an acquired taste, the Trans-Pecos mountains are the exception—they have an ineluctable allure. The greatest expanse of Texas parkland is located in these mountains, and despite their remoteness, they are well trod by tourists. Nevertheless, since triage has become the operative concept in land preservation, the Trans-Pecos region is not immediately in need of help.

Many other natural areas of Texas do need help, especially the prairies and tropical brush. Of the 19 ecosystem types, from Hawaii to Florida, that are considered critically endangered, 8—almost half—are found in Texas. The state currently has a healthy economy that beckons more development and more growth. But the palms and prairies, dunes and deserts, mountains and marshlands cannot be lost for the sake of economic growth. They are as much a part of the Lone Star state as Fort Worth and Dallas, ranches and oil fields, Sam Houston and the Alamo, and the vanished frontier.

A Senior Editor for *Texas Monthly*, **Suzanne Winckler** also served as an editor for *The Bird Life of Texas* (a two-volume set published by the University of Texas Press). Ms. Winckler is also a board member of the Texas Nature Conservancy.

The Land Texas Gave Away

by Bob Armstrong

THE HISTORY of land use in Texas is really a history of the transfer of public lands into private ownership. Whether the reasons were right or wrong—and there is evidence that both existed—Texas has spent a great deal of its governmental energy removing land from the public domain and placing it in the hands of the private sector. For instance, the state sold one of only three perennial West Texas waterfalls in a tract that brought $5.65 per acre in 1956.

Today, less than 7 percent of Texas land is publicly owned. The situation is enough to make the most avid sagebrush rebels drool and the most ardent conservationists gnash their teeth in frustration. If we, as a state, had had the foresight to keep at least the best areas, Texas would not now need so much help from The Nature Conservancy.

Perhaps it was that unwise "waterfall sale"—or the final realization that Texas lands are not infinite—that made the state decide in the late '50's to keep what was left in the public domain and manage it properly. It was not until the '70's, however, that Texas seriously began buying back selected tracts that had been so generously, frivolously, and sometimes necessarily sold for a song.

Necessarily? Why would a state sell virtually all of its public lands? In hindsight, we probably wouldn't have, at least not without retaining some for public use, to preserve a particular ecosystem or critical habitat, or to prevent the destruction of a specific area's productive capabilities. But these values are too frequently taught by experience and by history. (And as someone once said, "History may be the best teacher, but sometimes the tuition is awfully high.") The Conservancy understands these values. I think the Indians probably did too; but the early Texans weren't inclined to learn lessons from the Indians. They were worried about taming a land that wasn't going to give in easily.

THE REPUBLIC of Texas declared its independence from Mexico on March 2, 1836. On that date, the total acreage in the public domain stood at over 216.3 million. Mexico and Spain had already granted more than 26 million acres to individuals within the Republic's boundaries, and these grants were later ratified under the Treaty of Guadalupe-Hidalgo on February 2, 1848. The new Republic followed the example set by Mexico and Spain: to control the land you populated it with your own people. (The more people, the more control.) And to lure people to new territory, you gave them the only thing you had—the land itself.

So began the process of using land to meet the needs of a young republic and, later, a young state. First, 40 million acres went to the Republic's settlers. Then, when the citizens wanted an army and a navy, grants—in the form of 10 million acres—were awarded for military service. Cash was required to run the government, so landscrips (certificates entitling their holders to a certain amount of public land) were sold. That took care of 4.5 million acres. To pay for the state's capitol building, which when completed was the world's seventh largest building, another 3 million acres were sold. A whopping 37 million acres were granted for railroads and irrigation canals, for improving navigation, promoting industry, building ships, and plotting roads. Finally, lands were dedicated to public education: 50 million acres for schools and 2.3 million for The University of Texas, which—it was later discovered—overlay the vast oil reservoirs of the Permian Basin, making the univer-

sity the richest in the world.

As acres changed hands, fortunes were made and lost. Chicanery and fraud were not uncommon. Land titles were often clouded, making a great deal of work for lawyers at the time and no small amount of work for lawyers of the future. At least that segment of the economy prospered.

And that isn't all of the story. After it was annexed in 1850, the new State of Texas ceded 67 million acres to the United States, for which it was paid $10 million to retire the debt amassed by the Republic. Not a bad deal for a fledgling state. . . . Perhaps not at the time, but with the 20/20-vision of hindsight, consider this: the land transferred to the U.S. included the Oklahoma Panhandle, the southwestern corner of Kansas, a good portion of eastern and central Colorado, a small strip of southeastern Wyoming, and about half of New Mexico.

AFTER TRANSFERRING almost a quarter of a billion acres out of the public domain, what does Texas have left today? The state's General Land Office now manages some 22.5 million acres—an area that would be just larger than Maine if the properties were contiguous. Not only are they not connecting, but many acres are submerged or merely represent mineral interests. Most of the land is in the Chihuahuan Desert in far West Texas. Fortunately, rivers have stayed in the public domain, although landowners bordering the streams frequently view canoeists and rafters much the way earlier settlers regarded the Indians.

But what remains is more than a question of public lands and private lands. According to A. W. Küchler, there are 116 different major "potential natural vegetation types" or ecosystems in the United States. Of these, 19 lack adequate protection, and 8 of these 19 imperiled types exist only in Texas. Unfortunately, today, as in the past, very real economic pressures are forcing the conversion of even these native Texas lands.

Purchasing land for conservation purposes has become increasingly expensive. In May 1982, Texas farmland cost an average of $576 per acre, having risen 17 percent from February 1981. Compare this with the national decrease in farmland prices of 1 percent for the same period. Still, Texas farmland sells for less than the average national price per acre of $788. What this says for conservation acquisitions in the state (using farmland prices as a gauge) is that Texas land is slightly cheaper than the national average, but it is increasing in price faster than in any other state. (California and West Virginia, which rank second, experienced rises of 10 percent in farmland prices over the same period.)

Furthermore, federal and state agencies are restrained by the legal limits of their abilities to negotiate. This is why the Conservancy, as a private landowner, is free to negotiate in ways that agencies can't, won't, or haven't. While an agency may spend months unsnarling the "red tape" of an outright acquisition of land, the Conservancy has a pocketful of methods: conservation easements, lease agreements, gifts of land, bargain sales at less than market value, to name a few.

Although the state's income from its ownings is bountiful, we Texans find ourselves short of parklands. Not only do we have to buy lands for prisons, but we are constantly in search of funds, whether federal or private, to buy critical wildlife habitat or to protect ecosystems we sold years ago. State-levied cigarette tax monies are dedicated to parkland acquisitions; nonetheless, demands weigh more heavily on the side of people-oriented, close-to-the-city parks. Endangered areas of high ecological value or vital wetlands all too often lose priority to boat ramps, administration buildings, or maintenance services. In addition, though we have set up some governmental and quasi-public groups to address these needs, unforeseen and unintentional quirks in our administrative and funding mechanisms have effectively frustrated many of these people. Consequently, private groups like The Nature Conservancy—which is free and clear of the state's comparatively small measure of "red tape"—are now playing an increasingly important role in helping the state do something it should have done long ago.

TWO MONTHS AGO I could look out my window at a wooded mountainside that was always well worth exploring. Steep but well vegetated, it comfortably housed mockingbirds, vireos, scarlet tanagers, and probably around 25 pairs of other species that I couldn't identify. Today, there are no more than ten trees left after the bulldozers and some very innovative engineers have knocked down and scraped off a whole mountain to comfortably accommodate four pairs of *Homo sapiens.*

Texas—it's a lot of land and a lot of missed opportunities. But a few good chances remain. To take advantage of these chances, we still need help from the Conservancy—to make us aware of what we have, to identify the best places, and to do something about saving them.

Rancher/lawyer **Bob Armstrong** traveled a 350,000-mile campaign trail across Texas in 1970 to win election as commissioner of the General Land Office, a position he has held for the past 12 years.

George O. Miller

Honey Creek Ranch: Gem of the Texas Hill Country

by Donna Sanders

"Here the water flows between the mighty roots and tall trunks of two cypress trees, plunges foaming over the ledges into a rock basin, and spreads a delicious coolness in the shade of the dense foliage. . . . To the northwest lay the broad open prairie covered with lush green grass and colorful blossoms."

—From early accounts of the Texas Hill Country by Hermann Seele.

IF, LIKE ME, you grew up with Saturday matinee impressions of the American Southwest (the dry-gulch, scorpion-filled, poisoned-waterhole version), then visit the Central Texas Hill Country and you'll change your ideas. There are spring wildflowers—Indian paintbrush, red and yellow columbine, bluebonnets, purple verbena, pink evening primrose—backed by dark blue hills and lighter blue skies. Cypress trees shade cool limestone creeks, whose beds are worn table-top smooth by the water's steady flow. Live oaks and junipers dot the savannas where nine-banded armadillos dig their dens. Scissor-tailed flycatchers swoop over the grasslands, their long two-pronged tail feathers more noticeable in flight. But the brightest gem of the Texas Hill Country is Honey Creek Ranch.

Here, 30 miles north of San Antonio, the Texas Nature Conservancy has purchased 1,825 acres of wooded grasslands, deep canyons, and spring-fed

streams. This kind of country is nearly gone now, though it is recalled in faded paintings, yellowing volumes, and by the very old. From these pictures and accounts, startling in their revelations about the way the land used to be, we can more fully appreciate the "original Texas" the Conservancy seeks to protect at Honey Creek.

In terms of permanent settlement, "used to be" was not very long ago in Central Texas. The City of Philadelphia had already celebrated its sesquicentennial when, in 1842, a group of German noblemen and intellectuals, inspired by reports of Texas' unbounded prairies, lush woodlands, and exotic animals, formed a society called Adelsverein to promote colonization in the new republic. It was a venture undertaken as much for philosophical and ethical reasons as for commercial gain—a reaction to the political repression, overpopulation, and economic distress that plagued Germany in the mid-19th century.

Nurtured by utopian visions of writers like Goethe, this unlikely coalition of landed gentry and radical liberals sought a virgin landscape rich and expansive enough to accommodate the ideal society they hoped to build. Their choice must have been obvious when Prince Carl of Solms-

George O. Miller

Texas yellow stars intrude upon a field of bluebonnets.

George O. Miller

Honey Creek Preserve's savanna lands are denning grounds for the nine-banded armadillo.

Robert W. Parvin

Blue-green and slightly translucent, as if shot through with mica, Honey Creek runs past dwarf palmetto and bald cypress.

A squat prickly pear cactus among Honey Creek's bluestem grasses.

Braunfels described the Texas Hill Country to his fellow association members: It is "a land of milk and honey, of perennial flowers, of crystal streams rich and fruitful beyond measure, where roamed myriads of deer and buffalo, while the primeval forests abounded in wildfowl of every kind."

Prince Carl's claims were not an early manifestation of "Texas brag." The farmers, artists, botanists, architects, and others who came to Texas with Adelsverein left behind a vivid record of a land they quite possibly would not recognize today. One of the first colonists, Hermann Seele, a lawyer and teacher who joined Prince Carl in the settlement of New Braunfels, wrote of the "wilderness sea of grass," the vast prairies rolling before him to distant blue hills where "isolated groups of trees stand out like islands."

Seele was surprised and seduced by the area's rivers and streams, their waters reminiscent of Germany's clear forest lakes, their banks lined with towering trees that rose in terraces to the prairie. He recalls the valley floor along the Guadalupe River with its "dense forests of nut trees, cembra pines, wild cherry trees, elms, sycamores, and massive cypresses" and remembers where "the underbrush, bushes, wild hemp, and other plants [at river's edge] were so dense and the trees on the island in middle of the river so high" that he had to climb an elm before he could attract the attention of friends standing on the opposite bank.

THE WRITINGS of botanist and naturalist Ferdinand Lindheimer offer a more scholarly 19th century inventory of the Hill Country's diversity. A young cousin of Goethe and a political refugee of the early 1830's, Lindheimer lived for many years in New Braunfels where he organized the flora of Texas into a system. To honor this achievement, Harvard botanists of the day gave Lindheimer's name to a genus of the state's wildflowers and to some 20 plant species. But for all their observations, the chroniclers of the Hill Country, even the scientist Lindheimer, failed to recognize the fragile fabric of their unspoiled wilderness or to anticipate the profound transformation it would undergo.

Change began when the first spades and hoes broke through the mat of deep-rooted grasses that for millions of years had bound the characteristically shallow soil of the Edwards Plateau to its limestone underpinnings. It accelerated as herds of cattle, sheep, and goats trampled and gnawed the aboriginal savannas down to bedrock. It climaxed after decades of Hill Country storms released the exposed soil in churning torrents across an unresisting landscape, silting over the once-clear rivers, springs, and streams.

As more and more of the topsoil was subtracted by erosion, the open prairies were inundated with the scrub juniper that Texas called cedar. Strong native grama and bluestem grasses were replaced by thorny, aggressive plants and grasses distinguished only by their ability to survive a bare-rock existence. And, as Texas writer John Graves points out, "deterioration was usually rapid, and it took place so long ago that the aftermath we now view seems natural to us. . . ."

In describing the disappearance of the Hill Country, Graves is not without optimism: ". . . more fortunately perhaps than we deserve, our Texas hills do bide a few places where the context of things shows through, where mottes of live oaks and open stretches of strong native grasses and venerable hillside cedars and cypress-shaded creeks still give a sense of what this whole heartland limestone region once was like." Honey Creek Ranch is one such place.

HONEY CREEK lies just 25 miles from Prince Carl's enduring community of New Braunfels. About a thousand acres of the ranch, its eastern and southern quadrants, are juniper/live oak uplands. The flat grassland savanna contrasts sharply with the distinctive rugged hills of the Edwards Plateau, a semiarid tableland that falls away to the north and west to meet another world—the 800 or so acres of dense vegetation that line Honey Creek. Seeing each part separately, someone unfamiliar with the Hill Country would never believe one could merge into the other.

It would be inaccurate to imply that the Honey Creek savanna went untouched by the random cultivation and over-grazing that has altered so much of the region; yet even an unpracticed eye can see that these grasslands are different from the rest. Since the Conservancy's "arrival" in 1981, over 50 species of grasses have been identified on the ranch. Its strongest natives, the little bluestem and the Indiangrass, have already begun to dominate the uplands. This juniper/live oak savanna is found only on the Edwards Plateau.

The contrasting riparian forest along Honey Creek shows little sign of human trespass. Steep

James Tallon/Outdoor Exposures

The loggerhead shrike, one of the preserve's 250 bird species.

limestone cliffs running down the eastern bank of the spring-fed stream are partially concealed by dense thicket and clinging trees. As far back as 5000 B.C., the cliffs were ideal shelter for hunter-gatherers. Campsites strewn with chipped stone tools now document these people's presence, but their history is vague, haunting, and speculative.

Sycamore, box-elder, and bald cypress—some towering as high as 100 feet—line the creek's course to its confluence with the Guadalupe River. Blue-green pools are netted with lily pads; rills are sprinkled with watercress; and maidenhair fern cloaks the damp rocks. Even during legendary droughts that reduced the Guadalupe to a chain of puddles, the springs feeding Honey Creek continued to flow, providing a "life boat" for the ranch's plants and animals.

The area harbors several rare plants, such as Carolina basswood, disjunct and uncommon on the Edwards Plateau; spice bush, considered endangered in Texas; Texas ash, endemic to the state; and dwarf palmetto, the species that helps create Honey Creek's primeval atmosphere. The ranch also supports plants native to the state: Texas tridens, twisted-leaf yucca, Texas persimmon, and Texas yellow star.

Some 250 bird species favor Honey Creek, such as the threatened golden-cheeked warbler, which breeds in the juniper woods on Edwards Plateau. Green kingfishers, compact and pugnacious, hover above the creek, then plunge into the water, pursuing small prey. The endangered Guadalupe bass is one of the 10 fish, native to Texas, that thrive in Honey Creek's glassy waters.

Robert W. Parvin

Lily pads net the surface of the water where Honey Creek pools in its deep limestone bed.

HISTORICALLY as well as naturally, Honey Creek Ranch embodies the Hill Country. Though there are hints of a Spanish presence in the area, perhaps during the early 1700's, the language of the immediate past is German. In the 1850's and '60's, German farmers who had left colonized Adelsverein settlements like New Braunfels began moving out into the fertile river valleys of the surrounding Hill Country. Two brothers, Adam and Peter Doeppenschmidt, homesteaded Honey Creek during the closing years of the Civil War. A cemetery near the main gate of the ranch, a cedar log cabin close by the creek's headwaters, and over a mile of hand-built stone fences give slender testimony to the family's presence there.

Honey Creek had only one other owner until 1971, when the children of Otto and Meta Weidner, who had purchased the property in 1910, were forced to sell the ranch to satisfy inheritance taxes. Like their parents, the Weidner children had subsisted solely on the results of their labor on the isolated ranch. For most of us, who are employed by others, it is difficult to imagine such a life style. In little more than one generation, this Hill Country way of life is disappearing—so preserving Honey Creek has cultural as well as biological significance.

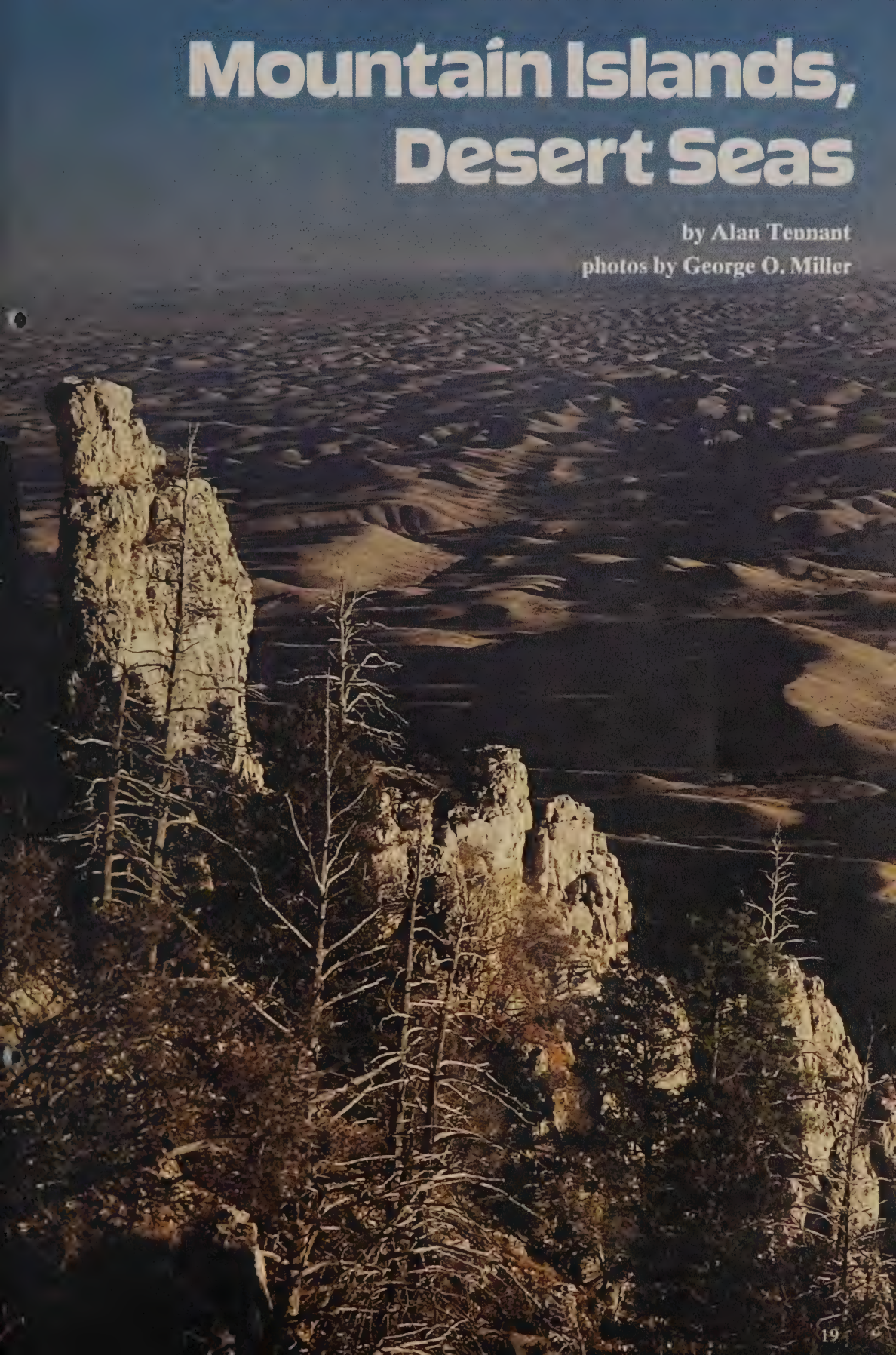
The natural and historical features of Honey Creek Ranch are still being inventoried and catalogued. Cave biologists are just now preparing to explore some 20 sinkholes that have been discovered on the property in the past few months; geologists are still mapping the extent of a basaltic dike —an unexpected swath of volcanic rock exposed for over a third of a mile on the limestone cliffs near the creek's confluence with the Guadalupe River; and the ranch's preserve manager rarely passes a day without finding new animal tracks to follow or hearing new bird songs to identify.

Honey Creek Ranch *is* the Texas Hill Country —the way it was, the way we would like it to be again. Wild, enduring, it will nourish the spirit of present and future generations of Texans, rekindling our sense of heritage and reaffirming our bond with the land.

Donna Sanders is assistant director for development and communications for the Texas Nature Conservancy.

Mountain Islands, Desert Seas

by Alan Tennant
photos by George O. Miller



ON THE HIGH DESERT plateau between Lordsburg and Las Cruces, New Mexico, the continental divide abandons the ridgeline crest of the Rocky Mountains and meanders on southward across the Mexican border toward the Sierra de la Madera. At a lower elevation 300 miles to the east, the mountains reappear, remnant segments of the Rockies. Rising darkly out of Texas's Trans-Pecos plain, they resemble some montane archipelago strung across a rolling desert sea. The comparison is not far-fetched, either visually or ecologically: tourists' photos of the mountains, snapped from the catwalk beneath the University of Texas's MacDonald Observatory on Mount Locke, are often mistaken for shots of gray-green Caribbean island seascapes. Like oceanic islands, the peaks are high enough to jostle the flow of maritime moisture as it slides past, two miles above. The resulting midday thunderheads and afternoon showers have transformed the summits' stony uplands into aerial island oases.

Besides the abrupt 5,000-foot transition from cooler, conifer-timbered mountains to surrounding desert floor, major evolutionary discrepancies also divide these two geologically and topographically separated biotic communities. Elevated by largely sedimentary formations, the montane biomes are Pleistocene anachronisms. Surrounded by the more recently evolved northern Chihuahuan shrub desert, these mesic highlands harbor relict populations of cooler/wetter-adapted flora and fauna that were formerly found throughout the more temperate, better-watered West Texas of the late Pleistocene.

A major example of the mountains' remnant vegetation is the big tooth maple. Derived from eastern sugar maples—which during glacial periods flourished far enough westward across currently inhospitably hot, dry terrain to interbreed with Rocky Mountain species—these trees currently hang on only in restricted riparian habitats scattered throughout the still-moist uplands. Along the upper reaches of sheltered high-country canyons, isolated populations of other moist climate woodland flora (including little walnut, chokecherry, and even Florida sawgrass) mingle with traditionally western montane plants, such as quaking aspen, ponderosa pine, alligator juniper, and Douglas-fir. Mammal, bird, and reptile populations follow the floral tapestry defined by the land's underlying geologic structure, and Rocky Mountain animals like elk, black bears, flammulated owls, and western tanagers meet disjunct eastern woodland forms—gray foxes, whippoorwills, black and white warblers, and black-necked garter snakes.

VALUED AS A RETREAT from the searing West Texas heat, the mountains are historically important as well: a diverse cultural mixture is reflected in their Indian, Spanish, and English nomenclature. The Apache, Chinati, Chisos, Guadalupe, and Santiago ranges, as well as Sierras Tinaja and Vieja, occur alongside montane archipelagos named Quitman, Davis, Baylor, and Van Horn. Following a century of commercial exploitation—mainly by overgrazing—the highest, coolest, and most heavily forested of these highland biomes are now under public stewardship in the Big Bend and Guadalupe Mountains National Parks, and the Davis Mountains State Park. Yet, because of the prevailing governmental perception of these montane preserves as primarily scenic recreational areas, the fluctuating biological boundary between mountains and desert is almost entirely overlooked, despite the parks' integral ecological relationship with the surrounding lowlands.

Below the high-country ponderosa stands, a sparser deciduous/conifer forest dots the ranges' northern flanks; while in their interior valleys, two-foot-high bull muhly and pinyon rice bunchgrass form miniature savannas interspersed with lower-altitude fingers of the woodland community. Then, starting on the upper slopes of the bajadas (piled accretions of eroded rubble that skirt the base of the mountain walls and join them to the adjacent plains), a rapid transition in the native flora occurs and the desert begins. Characterized primarily by succulent plants like narrowleaf sotol, lechuguilla, and New Mexico agave, the sparsely vegetated bajada inclines also support jumping cholla, paloverde, and slimleaf goldeneye. Near the foot of these stony slopes, where smaller rocks and more surface soil prevail, this indigenous succulent plant community typically merges with a denser desert-shrub association of herbivore-proof creosote, tarbush, and catclaw acacia.

Although they now pervade most of the Southwest, these lowland shrub deserts came into being only about 11,000 years ago, when the region's increasing aridity first began to degrade the original toboso, black grama, and fluffgrass prairie. More recently, the gradual encroachment onto the remaining plains of the succeeding creosote/acacia plant communities has been accelerated by droves of longhorn, then Hereford, cattle; their trampling hooves pinched off the shallow roots of the grassy zacatal (Spanish prairie) against the stony substrate lying just half an inch below its surface. Even with the grasslands gone, however, the herds are still there. Around Dell City, just west of the Guadalupes, irrigation wells allow the rich, un-

The Chisos Mountains at Big Bend National Park in West Texas.

leached Trans-Pecos soil to produce bumper crops of alfalfa, most of which are trucked in to the cattle stationed around feed depots in the shadow of the peaks.

Concentrated sulfates nourish the alfalfa and cotton here because the area is the bed of a vanished landlocked lake that, a hundred millenia ago, covered some 4,000 square miles of northern Chihuahua and adjacent West Texas. While drying, the lake first deposited a residue of both organic debris and mineral-rich montane effluents over the peripheral flats plowed today by Dell City John Deeres. Eventually, however, the steadily shrinking waters distilled such an intense concentration of gypsum and other mineral salts that—like the Great Basin salt lakes of Utah and Nevada—its final bed became a crusted plain of sodium chloride. In places it was so pure that during the 1870's the little community of San Elizaro earned its livelihood by digging and hauling the salt to El Paso, where it was used for tanning hides and making beef jerky. During the Texas "Salt Wars," the citizens of San Elizaro—having lost legal title to the flats to state judge Charles Howard—ultimately won back their mineral rights in a six-month guerrilla war waged against the combined forces of a U.S. militia brigade and a company of Texas Rangers.

A 4,000-ACRE AREA that encompasses both the historical and ecologically fragile salt flats and the still-evolving transitional zone between salt flat, zacatal grassland, creosote/acacia plain, bajada succulent desert, and montane woodland/savanna has been targeted for protection by The Nature Conservancy. Gypsum Dunes, which the Conservancy purchased in late 1980, is its centerpiece.

Surrounded by rolling saltbush/creosote plains, the dunes are composed solely of glistening gyp-

Left: Ten thousand years of southwesterly winds have sculpted lustrous gypsum fragments into this white West Texas duneland. The Conservancy's 226-acre Gypsum Dunes Preserve calls to mind the great White Sands of nearby New Mexico. Above: Earless lizards are among the preserve's camouflaged natives.

sum grains scoured from the summertime-dry salt flats by 10,000 years of southwesterly winds. The imperceptibly slow-moving dunes—little more than 50 acres in extent—of this miniature gypsiferous desert have now been pushed nearly a mile toward the vast, grayish-pink escarpment that marks the western boundary of the Guadalupe National Park. Piling up waves of luminescent sculptures, the dunes' curvilinear topography suggests the shadowland of the deep Sahara, because of the sands' almost total lack of line and detail.

There is life here, though, its tenacity emphasized by the severity of the artifice-smooth billows it inhabits. The Conservancy's property supports a number of plant species, such as Warnock's groundsel, gyp daisy, pitchfork, gyp nama, and white gyp stick-leaf that are limited to gypsiferous salt flats. But plants of any kind—more widespread nama waterleaf, gallardia or firewheel, desert chicory, and various herb sages—seldom grow more than a few feet into the dunes' trackless interior. Where vegetation occurs along the dunes' periphery, however, the sand is anything but trackless, for between the meager shelter of bare plant stalks, a delicate tracery of small vertebrate footprints is temporarily etched on the wind-burnished surface. The perspective is unique: clumsy bigfoot cottontail tracks blunder across the more finely stitched stickprints of scaled quail, the toe divots of kangaroo- and pocket-mice, and the diminutive skitter marks left by pallid earless lizards. Like ghost crabs on ocean beach dunes, these reptiles dart warily about, avoiding their carnivorous *Crotaphytus* relatives, the leopard lizards, which haunt the brushier gullies.

Within the dunes' barrier walls, however, the landscape is empty and eerily silent, even after the predictable evening gale blows up, raking white sprays of silica from the crests of the ridges and scouring away my tracks. The shimmer of surface ripples suddenly brings life to the sculptures' still surfaces and focuses my attention on the only nonfluid element in the sand: a line of delicate indentations between my planted boots where, deep within this apparently sterile, billowing granular cosmos, a small white caterpillar inches resolutely forward into its own very special wilderness.

Alan Tennant is a free-lance writer whose articles have appeared in *Audubon, Backpacker,* and *Texas Monthly*. His books include *The Guadalupe Mountains of Texas* (University of Texas Press), and *The Snakes of Texas,* to be published in spring, 1983, by Texas Monthly Press.

ECOLOGY FORUM

No. 46

By W. Frank Blair
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BIOGEOGRAPHY AND THE ANURANS OF TEXAS

One species ranges all the way from its center of abundance in South America's Amazon Basin, another from the harshest deserts of southern California and Mexico. These are just two of Texas's numerous toads and frogs—or anurans, as they are called collectively. The general diversity of the state's biota is clearly evidenced by the distribution of its anuran species. If one were to place colored overlays showing the ranges of the state's toads and frogs over a map of the Americas, the edges would reach north to Alberta, west to California, east to Nova Scotia and Florida, and south to Brazil.

Texas is a meeting place of biotic communities characteristic of a much broader geographical area—a kind of biological crossroads. The primary factors are the state's position, its physiographic features, its sheer size, and its geological history. To the east, the coastal plain forms the western end of a continuum that extends to the Atlantic. The limestone Edwards Plateau, which intrudes in central Texas, is eclipsed in the west by the desert basins and mountains of the Chihuahuan Desert. The South Texas plains are of a piece with the semi-arid subtropical brushlands of lowland Mexico, and the high plains of the north belong to a grassland system that sweeps up to Canada. Traveling the state's 800-mile width from El Paso to the Louisiana border, one sees an increase in annual rainfall from approximately 7 inches in the west to about 60 inches in the east. Along the 800-mile north-south transect, there is a gradient from average temperatures in the mid-50's on the northern Panhandle to the mid-70's in subtropical Brownsville.

The glaciers of the Pleistocene (Ice Age), the last of which melted some 10,000 years ago, brought dramatic vegetational changes as far south as Texas. Northern biotic zones were displaced southward to the Gulf of Mexico's coastal plain. Warmth-adapted southern species were pushed further south into Mexico or (in the East) peninsular Florida—or they became extinct. These continental changes of climate millenia ago provide one explanation for the state's extraordinary biotic diversity. Readjustments of ranges following the post-glacial warming have led to the present distribution of species.

A look at the distribution of the state's anuran species is a lesson in biogeography. From south to north, there is a "replacement" of tropical anurans with plains-adapted northerners. This is consistent with the change from the subtropical climate of south Texas to the cool continental climate of the north. Some of the southern species, exemplified by the giant or marine (Amazonian) toad, barely extend into the southern tip of Texas, reaching there the northern limits of their tropical/subtropical ranges.

Another of these southern invaders is the white-lipped frog, which belongs to a genus that has species throughout South America. They deposit their eggs in depressions filled with foam—glandular secretions of the female that are whipped into a froth by the male—where their tadpoles develop until rainfall washes them into temporary pools. (One interesting note on the white-lipped frog: since the males are known to call to their prospective mates from within underground cavities, one presumes that the responding females must dig them up.) The Rio Grande chirping frog, a small frog that has adapted well to man and is common in cities in extreme southern Texas (where it may appear at night on lawns, in gardens, or gutters), belongs to another genus of the same family. Laying large-yolked eggs, presumably on land, this frog skips the tadpole stage in its life history as do various other members of the family. Chirp-

ing frog species occur elsewhere in the state: the Mexican cliff frog in the mountains of the Trans-Pecos region, and the cliff frog on central Texas's Edwards Plateau.

The Mexican treefrog, the sheep frog (named for its bleating call), and the Mexican burrowing toad are three more immigrants whose ranges restrict them to the state's southern tip. The latter is a primitive amphibian whose ancestors ranged as far northward as southern Canada some 25 million years ago (when western North America was much more tropical than it is today). The sole remaining species ranges today from Costa Rica to southernmost Texas. Unlike these tropical species, the Gulf Coast toad has succeeded in pushing northward halfway through Texas, westward to the Pecos River, and eastward through Louisiana.

Entering Texas from the Sierra Madre of Mexico, the barking frog (whose call, when heard at a distance, resembles a dog's bark) is a member of the same tropical family as the white-lipped and chirping frogs. Its habitat is limited to the Edwards Plateau, where it is adapted for life on the limestone bluffs, laying its large-yolked eggs under boulders. Like the Rio Grande chirping frog, it has no tadpole stage.

The distribution of the state's anuran species along an east-west axis gives evidence that the moist/arid boundary in central Texas was displaced westward during the cooler phases of the Pleistocene. The meeting in central Texas of western arid-adapted species and eastern moist-adapted species is perhaps the most provocative feature of the biogeography of Texas frogs. Couch's spadefoot, the best adapted to arid conditions of all North American frogs, ranges from the deserts of southern California eastward to a north-south line that runs through Austin, Texas. The little green toad and the red-spotted toad, both desert-adapted, reach eastern limits near Austin. Eastward *from* Austin, the frog fauna becomes that of the moist plain of the eastern Gulf Coast. The green treefrog extends from the shores of the southern Atlantic westward to the Austin region, where it is abundant. The moist deciduous forests of southeastern Texas harbor a variety of eastern, moisture-requiring frogs, including the spring peeper, the squirrel treefrog, the chorus frog, the green frog, the pickerel frog, the pig frog, and the crawfish frog.

The existence of these east-west species pairs (separate species that have evolved from a common "parent" species) of Texas anurans is a vivid demonstration of the processes by which new species are formed. In some instances the eastern and western species meet in central or eastern Texas. In others the meeting is farther east. These present relationships are attributable to past shifts of ranges and consequent formation of new species as distributions were altered by major continental climatic changes.

A western and an eastern species of the narrowmouth frog meet and overlap in a broad strip east of Austin that extends from the Gulf Coast northward through eastern Oklahoma. (Forest clearing has undoubtedly broadened the strip.) These two populations arose from a single population, presumably separated by the climatic changes that produced the last continental glacier. They evolved differences in their mating calls (the calls of anurans, like those of birds, are so distinctive that they serve to identify the calling species), even though limited hybridization does occur in the overlap zone. Oddly enough, the calls of the species have diverged most notably in that overlap zone, a phenomenon that may be traced to the effects of natural selection operating against the hybridizing individuals.

The southern leopard frog and the Rio Grande leopard frog meet along essentially the same line in central and southern Texas, but there is very little overlap in their ranges. The mating calls are markedly different. This species-pair situation is complicated by the fact that a third species, Blair's (or plains) leopard frog, enters the state from western Oklahoma so that there are three species of leopard frogs replacing one another geographically in central Texas. Couch's spadefoot meets and slightly overlaps the range of an eastern species, Holbrook's spadefoot, just to the east of Austin. These species have very similar mating calls, but they are effectively separated by the limitation of Couch's spadefoot to clay soils and Holbrook's to deep sands.

The most complex and surprising relationship among east-west pairs is that of the gray treefrogs. For many years, there was thought to be a single species in the eastern third of the United States. We now know that three species are probably involved. Just a few miles east of Austin, the mating call changes abruptly, as does the chromosome number. The east-Texas treefrogs are *tetraploids,* having twice the normal number of chromosomes in their cells, something known in South American and African species but previously unsuspected in North American frogs. Going eastward into Louisiana, the tetraploid frogs give way to ones with the normal chromosome number. The tetraploid species has been sighted from Texas to New York. It may be that the geographically intermediate tetraploid species was produced through hybridization of the two diploid species that now flank it geographically.

A few of the Texas anurans have eastern counterpart species whose ranges overlap them farther east (or are still separated from them but farther east). One such pair is that of Texas's Strecker's chorus frog and the ornate chorus frog, which ranges on the coastal plain westward barely into Louisiana. These two are very similar in appearance and life habits. Their mating calls are only slightly differentiated, though the distinction is great enough that the females manage to select the males of their respective species under experimental conditions.

The cricket frog of Texas overlaps an eastern species in Louisiana, where (as with the narrowmouths) the difference in mating calls is accentuated in the overlap zone. The widest disjunction of any of the east-west pairs is that of the canyon treefrog of Trans-Pecos Texas and the Southeast's pine woods treefrog (federally listed as an endangered species), which ranges as far west as the Mississippi River. In this case, it is the similarity of their mating calls that serves to signal their relationship.

Remnant (or "disjunct") populations—left behind when northern species were displaced southward during glacial times and subsequently withdrew northward—are another element of species diversity among Texas anurans. The nationally endangered Houston toad is such a remnant of the southward displacement of the American toad, the nearest of which are found in southeastern Oklahoma. A few populations remain on the eastern coastal plain—with the principal one located near Bastrop, Texas. Plains spadefoots in the southern tip of the state may represent a similar displacement of a northern species.

The distribution of anurans in Texas is only one register of the state's remarkable faunal diversity. From the subtropical south—to the biotic mixing bowl of the Edwards Plateau—to the mountains and basins of the Chihauhuan Desert—to the high plains of the northern Panhandle—Texas's environments provide critical habitat for numerous jeopardized animals. It is a major conservation challenge to safeguard natural areas representing the full array of communities: a challenge that The Nature Conservancy is working energetically to meet.

Endangered Species Act to be Reauthorized

The federal government's commitment to species conservation was reaffirmed this summer when Congress voted to extend the Endangered Species Act for another three years. The House of Representatives approved the extension on June 8th by a voice vote; the Senate followed with its approval the next day. Minor differences between the House and Senate versions will be reconciled in a conference committee before the measure goes to President Reagan for his signature.

As one of the nation's leading private conservation organizations, The Nature Conservancy was invited to present its views on the bill. In testimony on March 8th before the House Subcommittee on Wildlife Conservation and the Environment, Conservancy President Bill Blair affirmed the organization's strong general support for the Endangered Species Act and suggested a few specific changes. He asked that possible economic effects be ruled out as a point of consideration in deciding whether a species should be listed for protection. (Economic analysis would still be required in determining what critical habitat lands must be protected to safeguard listed species.) He also emphasized the primary importance of reliable species information in the process by which the federal government "ascertains" what plants and animals to list as endangered or threatened. He pointed to Conservancy-designed state natural heritage programs as an effective means of collecting and continuously refining scientific data of this kind and urged support for such efforts. Blair repeated his testimony, with minor changes, on April 19th to the Senate Subcommittee on Environmental Pollution, Committee on Environment and Public Works.

The Conservancy was tremendously pleased to see that both the final House- and Senate-approved versions of the bill removed economic criteria from the listing process, streamlined the ascertainment and listing processes, and generally enhanced species protection. The final legislation promises to be an improvement over the existing Endangered Species Act. Notable among the champions of this critical reauthorization were Congressmen John Breaux (D-LA) and Edwin Forsythe (R-NJ) and Senators John Chafee (R-RI), Slade Gorton (R-WA), and George J. Mitchell (D-ME).

NEW PROJECTS

ARKANSAS

Overflow Bottoms—Addition—(Ashley County). In cooperation with the U.S. Fish and Wildlife Service, the Conservancy has acquired an additional 2,000 acres of prime migratory bird habitat—hardwood swamps, high and low floodplains—along the lower Mississippi floodway. Two interest-free loans, one from the Winthrop Rockefeller Foundation of Little Rock and the other from the State of Arkansas, have funded the entire project (which includes acquisition of 2,127 acres in 1980 and 1,884 in 1981). This final parcel will be conveyed to the U.S. Fish and Wildlife Service for inclusion in its Overflow National Wildlife Refuge.

FLORIDA

Ordway-Whittell Kissimmee Prairie Preserve—Addition—(Okeechobee County). A conservation easement on 325 acres enhances protection for the last sizable grassland remnant in central Florida, bringing total preserve acreage to 6,415. Kissimmee is open palmetto prairie-land interspersed with grassy sloughs, depressions, freshwater marshes, flatwoods, and hammocks—inclusions comparable to the pothole marshes and ponds of the Dakota prairies. It's a refuge for federally threatened and endangered wildlife species (American alligator, bald eagle, Florida panther) as well as white-tailed deer, bobcats, Audubon's caracaras, burrowing owls, Florida sandhill cranes, and wood storks. The area is owned and managed by the National Audubon Society.

Tiger Creek—Addition—(Polk County). In its passage through swamp woods and sandhills—clear, wild Tiger Creek skirts lands subdivided for development. The recent acquisition of 50 acres on the eastern arm of the preserve safeguards the area's most mature hardwood hammock and averts the threat of damaging alterations on a portion of the river's floodplain. Habitat for bobcat, otter, and a number of more common mammals, the preserve also boasts breeding grounds for the federally threatened American alligator. Rare plants endemic to the state grow here as well, including pygmy fringe-tree and pigeon wing. The Florida Chapter's Tiger Creek Committee manages the 2,946-acre area in conjunction with the American Foundation.

ILLINOIS

Ridgetop Hill Prairie (Woodford County). Working with the ParkLands Foundation, a nonprofit group that safeguards natural lands in central Illinois, the Conservancy's Illinois Chapter has acquired 19 acres of upland woods, bottomlands (along the Mackinaw River), and undisturbed hill prairie. Charted for dedication as a state nature preserve, the property will be conveyed to ParkLands for management.

Sunbury Prairie (Livingston County). Edging both sides of an abandoned railway track in north-central Illinois, a 12-acre ribbon of black-soil tallgrass prairie has escaped unscathed. A remnant of the Grand Prairie ecosystem, which once covered half the state, this is one of just a few dozen significant grassland tracts identified through an exhaustive survey of Illinois railway corridors. On the well-drained higher ground, big bluestem and Indiangrass flourish—and in lower, wetter portions, there is prairie dropseed, cord grass, and reed grass. The Conservancy purchased the property from Illinois Central and Gulf Railroad Company in cooperation with the Prairie Lands Foundation, to which it will be transferred for management by Fairbury-Forrest Nature Club.

Wagon Lake Preserve (St. Clair County). It's an 85-acre stretch of shrub swamp and pond communities ringed with woods—resting grounds for migratory waterfowl and a nesting site for indigenous birds and mammals. Lying in the Kaskaskia River basin of south-central Illinois, the new preserve supports populations of two plant species that are extremely uncommon in the state: fragrant water lily and water featherfoil. The Illinois Department of Conservation will lease and manage Wagon Lake, soon to be dedicated as a state nature preserve.

INDIANA

James-Tippecanoe Wetland—Addition—(Kosciusko County). This stretch of shallow fresh marsh, deep fresh marsh, and shrub swamp is part of the most extensive wetland complex remaining in northern Indiana. The marsh links Lake Tippecanoe and James Lake, and provides breeding, nesting, and feeding grounds for numerous waterfowl. It also hosts many other birds as well as furbearers, reptiles, and amphibians. A new 135-acre

acquisition brings Conservancy-protected lands here to 193 acres. A fund-raising committee, with the aid of a substantial matching grant obtained through Edmund F. Ball, is working to cover the costs of completing the project. The preserve is managed by the Muncie YMCA as part of its Camp Crosley environmental education program.

MARYLAND

Nassawango Creek—Addition—(Worcester County). An untrammeled vestige of the towering cypress forests that greeted the first settlers, Nassawango Creek Preserve lies along a tributary of the Pocomoke River on Maryland's Eastern Shore. An 18-acre addition brings Conservancy protection here to 1,281. Some 17 species of colorful warblers, as well as wood ducks and pileated woodpeckers, thrive along the stream—as do numerous mammals, including river otters, minks, gray foxes, opossums, weasels, and flying squirrels. The Maryland-Delaware Field Office, which manages the preserve, has its sights set on a completed assemblage of 2,500 acres along 15 miles of Nassawango Creek.

MICHIGAN

Skekemog Lake Natural Area—Addition—(Kalkasha County). A gift of land from Clarence E. Davis enlarges the 3,160-acre state-protected wetland wildlife habitat by 30 acres. The extensive swamp and marsh area—habitat for bear, bobcat, river otter, massasauga rattlesnake, and coyote—is a nesting site for osprey, loons, swans, and other birds. The property will be transferred to the Michigan Department of Natural Resources for management.

MINNESOTA

Grace Nature Preserve—Addition—(Goodhue County). Some 60 miles southeast of Minneapolis, this hardwood forested bottomland on the Zumbro River harbors the Minnesota dwarf trout lily (*Erythronium propullans*), the state's only known endemic plant. A newly acquired 2.5-acre buffer tract, an abandoned railroad grade that runs along the southern boundary of the preserve, brings total acreage to 16.5. The Conservancy's Minnesota Chapter manages the area.

MISSISSIPPI

Pearl River—Addition—(Pearl River County). In concert with the State of Mississippi's Wildlife Heritage Commission and the U.S. Fish and Wildlife Service, the Conservancy is seeking to safeguard some 40,000 acres of prime southern bottomlands near the Pearl's confluence with the Bogue Chitto River. With the acquisition of this 644-acre tract of bottomland hardwoods with frontage on the river itself, Conservancy-protected lands total 14,644 acres. Interlaced with streams, sloughs (like the great, slow-moving Dead River), and oxbow lakes, the project area is choice wildlife habitat—hosting some 47 species of mammals (including black bears and bobcats), 150 birds, and 13 reptiles. The property, acquired as part of the Conservancy's highly successful Rivers of the Deep South Program, will be conveyed to the Mississippi Department of Wildlife Conservation for management.

NEW YORK

Loines Preserve—Addition—(Warren County). A six-acre gift from Elma Loines enlarges the existing preserve westward, adding marshland, woods, and 5,000 feet of undisturbed shoreline on Lake George's Northwest Bay. The preserve helps protect two species considered threatened in New York, timber rattlesnake and rock cress (*Arabis missouriensis*). The Eastern New York Chapter's Loines Preserve Committee manages the 31-acre area.

NORTH CAROLINA

Goose Pond Bay (Robeson County). Targeted for protection under the North Carolina Nature Conservancy's Carolina Bays Project, this 64-acre property harbors the rare sarvis holly (*Ilex amelanchier*): a shrub that is threatened throughout its range. In fact, Goose Pond Bay supports the most extensive, best-preserved mature climax stand of the pond cypress/sarvis holly plant community known in the Carolinas. The "bay" itself is a shallow, elliptical depression of unknown origin—a reminder of the many thousands that once stippled the coastal plain from North Carolina to Georgia. The North Carolina Nature Conservancy manages this newly acquired "national critical area"—another success of the Conservancy's campaign to safeguard examples of America's most highly jeopardized ecosystems.

OHIO

Frame Bog/Herrick Fen Preserve—Addition—(Portage County). The purchase of this 12-acre property adds undisturbed beech-maple forest and buffer for the 114-acre preserve's glacial fen, a national natural landmark and dedicated state nature preserve. One of the few remaining sphagnum-tamarack bogs in the state, the area supports relict northern flora, including species considered rare in the state. White camass, shrubby cinquefoil,

round-leaved sundew, grass-of-parnassus, cranberry, and bayberry prosper on the preserve, which is managed by the Ohio Chapter under a lease arrangement with Kent State University.

WASHINGTON

Lind Shrub-Steppe Preserve (Adams County). It's one of Washington's best remaining plots of big sagebrush/Idaho fescue grasslands, a plant community once common in the state. The 5-acre site, which rides a gentle slope above wheatfields and grazing land southwest of Spokane, hosts a sizable population of Piper's daisies (*Erigeron piperianus*), a plant that is a candidate for listing by the Endangered Species Office of the U.S. Fish and Wildlife Service. The property, a gift of Mrs. Dorothy L. Doyl and D. A. Davis Farm, Inc., will be managed by the Washington Field Office.

Union Camp Corporation

Camassia Slopes

Even the most impassive botanist would be disoriented by *these* blossoming slopes. It looks for all the world as if a piece of the Midwest has taken up residence in North Carolina. The wildflowers here along the Roanoke River's north bank are "disjunct" from their normal range west of the Appalachians—stranded, perhaps, by glaciers during the Pleistocene. While the acidic soils of the surrounding land foster the growth of familiar southern species, these highly basic soils have created an outdoor herbarium of extraordinary plants.

Abundant wild hyacinths, *Camassia scilloides,* give the site its name (some 500 individuals, or 98 percent of the state's total population, in this one disjunct community). And there are peripheral populations of sessile trillium, eastern wahoo, James sedge, and Atlantic isopyrum as well. All told, the property supports 25 vascular plant species designated by the state as endangered, uncommon, or rare on the coastal plain—not to mention three state-threatened birds (cerulean warbler, turkey vulture, and red-shouldered hawk).

The protection story is a conservationist's dream. The North Carolina Natural Heritage Program, which discovered the site's significance, brought it to the Conservancy's attention. The Conservancy brought it to the attention of the owner, Union Camp Corporation: a forest products company that had previously donated key lands in three southeastern swamps (Virginia's Great Dismal, Georgia's Okefenokee, and North Carolina's Chowan). The response was stunningly quick. Within a matter of months, Union Camp—which has committed itself through its Land Legacy Program to safeguard holdings of ecological or historical value—made 176 acres at Camassia Slopes a new gift to the Conservancy.

Camassia Slopes is one of 20 Roanoke River Basin properties recommended for protection by the North Carolina Natural Heritage Program. In cooperation with the state, the North Carolina Nature Conservancy will be working in coming years to safeguard more of the river's floodplain forests and luxuriant slopes, a haven for rare plants and animals.

From time to time, The Nature Conservancy exchanges membership lists with other conservation organizations whose work might also interest you. In this way, we are able to increase the Conservancy's membership at a lower cost than would otherwise be possible. However, if you prefer *not* to receive these mailings from other organizations, please attach the mailing label from this magazine (or copy the label *exactly*) and mail it to:

Membership Secretary
The Nature Conservancy
1800 North Kent Street
Arlington, Virginia 22209

NEXT IN THE NEWS:
PLACES OUT OF PLACE

The November/December issue takes you time-traveling—on today's landscape. Learn about Ice Age bogs and other refugia: remnants of the past that still persist where climatic and topography permit. It's places out of place and the rare species they harbor, next in the *News*.

UNUSUAL INCOME OPPORTUNITY

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If you want to explore, confidentially, how such a gift might increase your annual income, please contact Alice A. Pinsley, Director of Capital Giving, The Nature Conservancy, 1800 North Kent Street, Arlington, Virginia 22209, (703) 841-5374.

Turn your white elephant into a snowy egret—through a gift of trade land

Do you own residential, commercial, or industrial property—farmland, mineral rights, or a villa in Spain? The Nature Conservancy accepts gifts of appreciated real estate: properties without any significant ecological value that can be sold to produce funds for natural area protection. Over the last few years, these "trade lands" donated by individuals and corporations have channeled more than $12 million into the Conservancy's land conservation programs. In 1981 alone, 48 individuals and corporations used this tax shelter to donate property that will net the Conservancy more than $6.5 million. A gift of trade land is one way you can help safeguard America's natural heritage—and, at the same time, realize tax benefits that can offer a greater return than a sale on the open market.

There are many ways to make a donation of this kind: outright gift, bequest, undivided interest, gift-leaseback, bargain sale. . . . Our professional staff can work with you and your advisors to determine the most beneficial gift structure available. If you would like more information about this innovative way to contribute, please write to Ray Culter or Pat Noonan at: The Nature Conservancy, 1800 North Kent Street, Arlington, Virginia 22209—or call (703) 841-5351.

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An individual becomes a Life Member of The Nature Conservancy upon contribution of $1,000 for membership dues or for the Land Preservation Fund, Guarantee & Income Fund, or a State Land Preservation Fund.

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